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ON BIVALVE MOLLUSCS OF THE ISLAND OF PORTO SANTO (MADEIRA, PORTUGAL)

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With 1 figure and 2 tables

SUMMARY: Integrated in the evaluation of the impact of the 1989 "Aragon" oil spill in the island of Porto Santo (Madeira, Portugal) a study of soft bottom communities was carried out. One of the results of this study is a first cartography of bivalve molluscs of Porto Santo, now presented. Bivalves in Porto Santo are mainly microbivalves with the exception of *Venerupis aurea* which is here recorded from Madeira for the first time. *Ervilea castanea* is the most abundant species, representing 80% of the bivalves sampled.

RESUMO: No âmbito da avaliação do impacto da maré negra do "Aragon" na ilha de Porto Santo (Madeira, Portugal) foi efectuado o estudo das comunidades macrobentónicas. Um dos resultados desse estudo, agora publicado, é a cartografia dos moluscos bivalves da Ilha de Porto Santo, até à data inexistente. Os moluscos bivalves da área abrangida pelo estudo da maré negra de Porto Santo, com a excepção de *Venerupis aurea* pela primeira vez referenciada para a Madeira, são microbivalves dos quais *Ervilea castanea* representou 80% do total de exemplares recolhidos.

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INTRODUCTION

Following the "Aragon" oil spill of 1989, soft bottom communities of the island of Porto Santo were studied, both in intertidal and subtidal areas, down to 20m. Although, unfortunately no information was available on those communities prior to the oil spill, the present study based on quantitative sampling is a contribution to the knowledge of marine bivalve molluscs of Porto Santo.

METHODS

An intensive sampling survey on benthic communities was carried out on the macrobenthic communities of Porto Santo during May 1991. Soft substrate benthos was sampled at five locations (Fig. 1), from an intertidal to subtidal zone, down to -20m. Intertidal sampling was carried out in an area of 0.02m² with a hand corer (10 replicates), while for subtidal sampling a Van Veen grab in an area of 0.05m² (6 replicates) was used. Samples were sieved through a 1mm mesh sieve, and were frozen at -20°C, till identification and counting were carried out.

RESULTS

With the exception of *Venerupis aurea*, which is recorded from Madeira, for the first time, all the other eleven species being microbivalves (a common occurrence in the malacological fauna of these Atlantic islands) have been previously recorded from Madeira (Nobre, 1940). As in the Azores (GUERREIRO, 1994) *Ervilea castanea* is the most abundant species representing 80% of the bivalves sampled and, together with amphipods, dominates the benthos communities of transects G (Calheta) and H (Cais) from -5m down to -15m; in fact bivalves, amphipods and polychaeta are the major taxonomic groups in macrobenthic soft bottom communities of Porto Santo (FONSECA & GUERREIRO, 1993).

As shown in Table 2, higher densities of bivalves occurred in stations G3, G4, H2, H3 and H4, associated with medium and fine sands and higher values of organic matter in the sediment. The nature of sediment and organic matter seems to be determinant to the abundance of bivalves, thus, 61% of bivalves occurred in stations H2,3 and 4, where higher levels of organic matter were recorded.

CONCLUSIONS

Bivalves occurred in Porto Santo on the sandy south coast, associated with medium to fine sand and high values of organic matter, mainly in the Cais area and Calheta from 5 down to 15m. *Venerupis aurea* is for the first time recorded for Madeira, while the other eleven species are microbivalves, largely dominated by *Ervilea castanea*, which represented 80% of the total of sampled specimens.

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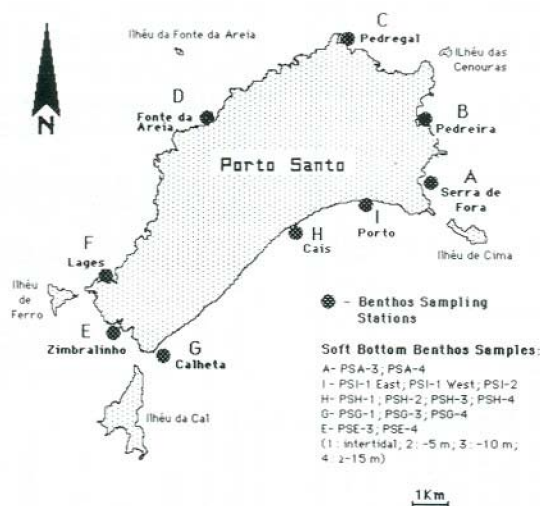


Fig. 1 - Porto Santo Island: Benthos sampling stations (Fonseca, 1992)

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Species/station	PSA3 ind./m2	PSA4 ind./m2	PSI - 1E ind./m2	PSI - 1W ind./m2	PSI - 2 ind./m2	PSH -1 ind./m2	PSH - 2 ind./m2	PSH -3 ind./m2	PSH - 4 ind./m2	PSG1 ind./m2	PSG3 ind./m2	PSG4 ind./m2	PSE3 ind./m2	PSE4 ind./m2
<i>Abra alba</i> (Wood)	0	0	0	0	4	0	0	0	13	0	0	0	0	0
<i>Donax vittatus</i> (Da Costa)	0	7	0	0	0	10	0	0	3	5	10	3	47	16
<i>Ervilea castanea</i> (Laskey)	43	0	0	0	0	10	1070	2500	3906	5	540	3713	57	128
<i>Gaffrarium minimum</i> (Montagu)	0	0	10	20	0	0	13	263	183	5	7	167	40	44
<i>Lima subauriculata</i> (Montagu)	0	0	0	0	0	0	0	0	123	0	0	40	0	0
<i>Notirus irus</i> (Linnaeus)	0	0	0	0	4	0	0	0	0	0	0	0	0	0
<i>Parvicardium ovale</i> (Sowerby)	0	0	0	0	0	0	0	0	7	0	0	3	0	0
<i>Parvicardium papillosum</i> (Poli)	0	0	80	0	128	0	3	0	10	0	3	13	47	4
<i>Tellina fabula</i> (Gronovius)	0	0	20	0	4	0	207	110	3	0	0	0	0	0
<i>Tellina tenuis</i> (Da Costa)	0	0	20	0	0	0	0	10	0	0	10	0	13	0
<i>Thracia papyracea</i> (Poli)	0	0	0	0	0	0	0	0	3	0	7	3	0	0
<i>Venerupis aurea</i> (Gmelin)	0	0	0	0	0	0	0	0	7	0	0	0	0	0
Total	43	7	130	20	140	20	1293	2883	4258	15	577	3942	204	192

TABLE 1 - Density of bivalves (ind/m2) in sampled locations in Porto Santo .

Parameters/Stations	PSA-3	PSA-4	PSI-1E	PSI-1W	PSI-2	PSH-1	PSH-2	PSH-3	PSH-4	PSG-1	PSG-3	PSG-4	PSE-3	PSE-4
Gravel	0	0	0.3	0.1	3.8	13	0.1	0.5	0.4	1.5	0	0.1	0	0.1
Very Coarse Sand	2.1	0	0.6	0.2	0.5	6.4	0.7	0.4	0.4	1.2	0.2	0.1	0.2	0.2
Coarse Sand	2.5	0.3	2.1	1.8	0.7	5.6	4.1	0.8	0.6	2.8	0.3	0.1	2.1	1.8
Medium Sand	29.4	54.2	81.8	50.4	8.3	37.5	61.1	29.2	19.7	76.6	22.1	16.6	51.1	37.3
Fine Sand	34.3	42.9	14.8	44.4	60.6	37.1	33.7	62.9	76.3	17.8	75.4	80.4	43.2	57.2
Very Fine sand	21.4	2.1	0.3	2.8	14	0.3	0.3	5.9	2.2	0.1	1.9	2.5	2.8	3
Mud	10.3	0.5	0.1	0.3	12.1	0.1	0	0.3	0.4	0	0.1	0.2	0.6	0.4
Organic Matter (g/m2)	237.3	153.6	176.3	225.1	263.5	216.4	216.4	261.8	192	221.6	235.6	162.3	178	294.9
%H2O	23.45	19.92	19.34	18.83	26.75	15.54	18.51	19.86	19.59	17.93	21.02	19.23	23.02	25.48
Chlorophyll c (mg/m2)	10	2.7	1	2	12.8	1.3	1.6	2.8	3.2	1.1	1.4	1.8	3.8	1.4
Margalef Index	2.59	2.69	3.08	2.29	3.59	2.5	2.74	2.57	3.05	2.41	3.12	3.29	3.1	3.43
Carotenoids (mg/m2)	44.6	11	6.4	3.5	77.6	4.2	9.2	8.9	13.8	2.8	8.5	8.1	12.1	7.9
Chlorophyll a (mg/m2)	41.9	10.7	4.4	4.4	27.7	4.5	6.9	8.8	8.9	3.9	4.9	4.9	8.2	4.8
Phaeopigments (mg/m2)	6.6	2.1	1.9	0.3	40.6	0.7	3	2.5	6.9	1.6	4.1	3.3	4.5	2.9
Chl. a Degradation (%)	13.62	16.67	26.69	6.25	59.5	13.46	30	22.41	43.75	28.57	45.65	40.48	35.61	37.5
Moss Index	1.24	1.14	1.04	1.09	0.97	1.21	1.16	1.18	1.06	1.07	1.14	1.09	1.05	1.05

TABLE 2 - Values of sediment parameters measured in each station (Fonseca, 1992).

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NOTES ON TWO MADEIRA PLANTS

By N. C. H. KRAUSS ¹

The composite plant «Abundância» (*Eupatorium adenophorum* Spreng.) has been known in Madeira for many years. On July 24, 1962 I collected a second species of *Eupatorium*, *E. riparium* Schultz-Bip., confirmed by the Royal Botanic Garden, Kew, England. This was growing in association with *E. adenophorum* in a damp area along a path near Monte. Both these species of *Eupatorium* are native to Mexico. I have seen *E. riparium* growing along a small stream in a ravine at the Desierto de los Leones, Distrito Federal, in the hills above Mexico City. Both species are pests in grazing land in Hawaii.

On November 7, 1960 I collected specimens of *Ulex minor* Roth (determined by Royal Botanic Garden, Kew) in the grassy hills above Ribeiro Frio. Since then I have seen it also at Encumeada and Santo da Serra. *Ulex europaeus* L. has been known in Madeira for a long time, but I have not seen any records of *U. minor*.

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